United States Naval Academy
Mechanical Engineering Department

EM446 Heating, Ventilating and Air Conditioning: Design and Analysis

Catalog Description: EM446 HVAC: Design and Analysis **Credit:** 3 (3-0-3)

Principles of thermodynamics, heat transfer and fluid mechanics as applied to the design and control of thermal environments. Cycles and equipment for heating, cooling and humidity control. Air transmission, distribution and cleaning are also considered.

Prerequisites: EM319 and EM320 or equivalent

Textbooks: McQuiston, Parker and Spitler, "Heating, Ventilation, and Air Conditioning," 5th edition, John Wiley & Sons, Inc., *Required*

Course Director: Prof. K. W. Lindler

Objectives[1]:

1. To introduce the student to heating, ventilation and air conditioning equipment. (a, b, c)
2. To be able to calculate thermodynamic properties of moist air and apply this to proper sizing of HVAC equipment. (a, b, c)
3. To understand the relationship between properly designed HVAC equipment and occupant comfort and health. (a, b, c)
4. To be able to calculate building energy gains from the sun at any time of day or day of year. (a, b, c)

Course Content:

No.	Topic or Subtopic	hrs.
1	Introduction	1
2	Air Conditioning Systems	3
3	Psychrometrics	9
4	Comfort and Health	2
5	Heat Transfer for Residential and Commercial Buildings	5
6	Solar Radiation Heat Gains	10
7	Sizing Heating and Cooling Equipment	5

Evaluation:

1. Quizzes
2. Homework
3. Exams
4. Design Report

Acquired Abilities[2]:

1. Students will demonstrate the ability to calculate energy and moisture gains for commercial and residential buildings. (1, 2, 3, 4)
2. Students will demonstrate the ability to properly design HVAC equipment to maintain occupant comfort and health. (1, 2, 3, 4)

Date of Latest Revision: 5 Nov 2001

[1] Letters in parenthesis refer to the Program Objectives of the Mechanical Engineering Program.
[2] Numbers in parenthesis refer to the evaluation methods used to assess student performance.